Factors Differentiating Sleep Disturbance Trajectory Groups, and Impact of Persistent High Sleep Disturbance on Health-Related Outcomes Two Years Post-Treatment in Cancer Survivors

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Background

- A longitudinal study examined trajectories of sleep disturbance among cancer survivors after completion of primary cancer treatment using latent growth mixture modelling (LGMM) (Chan et al., 2023)

- Two distinct trajectory groups of sleep disturbance emerged in a two-year longitudinal study after treatment completion among 623 Chinese cancer patients: **stable good sleep (69.7%) and persistent high sleep disturbance (30.3%)**
- Both trajectories were stable and did not evidence any clinically meaningful improvement or worsening over the 2-year study, suggesting sleep problems persist for survivors of diverse cancer types after cancer treatment

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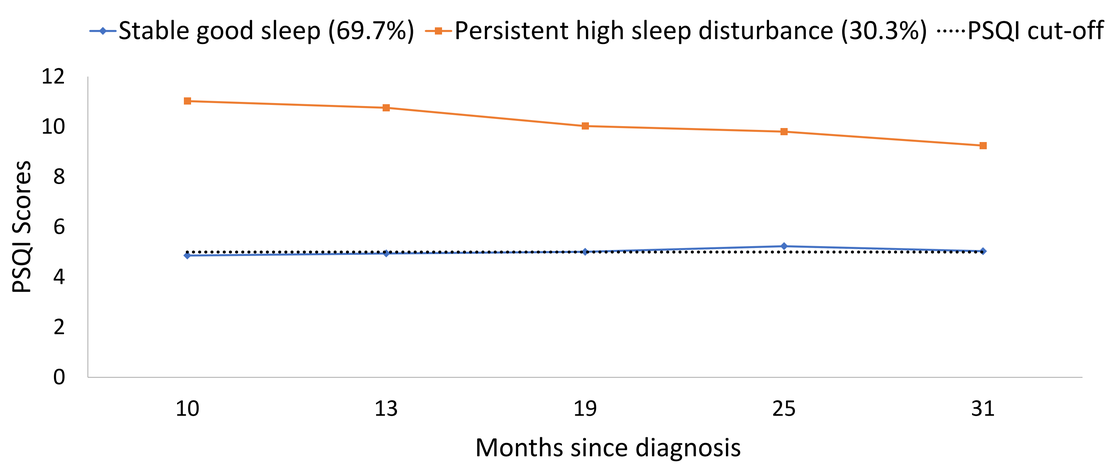

- Several psychological and physical factors may potentially predict the growth of sleep disturbance trajectories, including physical symptom distress, anxiety, depression, attentional bias and cancer-related distress after treatment.

- While the impact of insomnia on physical and psychological health has been examined in the general population (Fernandez-Mendoza & Vgontzas, 2013), and the immediate impact of sleep disturbance shortly after cancer treatment has been demonstrated (Sanford et al., 2012), its long-term effects on cancer survivors remain largely unexplored.

Objectives

- This secondary analysis examines whether **baseline** anxiety, depression, attentional control, attentional bias, physical symptom distress (**measured within 6-months post-treatment**) and cancer-related distress measured at 9-months post-treatment differentiated the observed SD trajectories;

- And whether the trajectories were associated with **longer-term health-related outcomes**, including fatigue, pain, physical and mental health functioning and general psychological distress at two-years post-treatment.

Methods

Participants
623 adult patients with non-metastatic, curable cancer (stage 0-3) and remained alive across the entirety of the study completed six questionnaires at baseline, 3 months (T2), 6 months (T3), 12 months (T4), 18 months (T5) and 24 months (T6) of follow up.

Primary outcome measure
Sleep disturbance (*Pittsburgh Sleep Quality Index)*; measured T2-T6.
Global score of >5 indicative of insomnia/poor sleep quality.

Baseline predictors
-Anxiety, depression (*Hospital Anxiety and Depression Scale)*
-Cancer-related hyperarousal, intrusive thoughts, avoidance (*Impact of Events Scale)*
-Positive/negative attentional bias (*Attention to Positive and Negative Information Scale)*
-Attentional control (*Attentional Control Scale)*
-Physical symptom distress (*Memorial Symptom Assessment Scale Short-Form)*

Two-years post-treatment health-related outcomes
-Psychological distress *(Chinese Health Questionnaire)*
-Physical/mental functioning *(Short Form-12 Questionnaire)*
-Chronic mental/physical fatigue *(Chalder Fatigue scale)*
-Chronic pain and disability *(Chronic Pain Grade Scale)*

Statistical Analysis
Binary logistic regression was performed to examine which measured baseline variables predicted trajectory membership and whether T6 health-related outcomes (two-years post-treatment) were associated with trajectory groups while adjusting for any significant covariates.

Results

Baseline predictors of persistent high sleep disturbance:
- Persistent high sleep disturbance group were less likely to report baseline **cancer-related avoidant**, while more likely to report **intrusive thoughts**, **hyperarousal** and **depressive symptoms** compared to good sleepers.

Table 1. Binary logistic regression of predictors on sleep disturbance trajectories (Stable good sleep group as referent)

	Model 1			Model 2		
	OR (95 CI%)	SE	Sig.	OR (95 CI%)	SE	Sig.
Employment (Unemployed as ref.)						
Full-time/part-time	0.43 (0.25-0.74)	0.27	**	0.45 (0.27-0.77)	0.27	**
Retired	0.73 (0.40-1.34)	0.31	NS	0.71 (0.38-1.31)	0.31	NS
Housewife	0.46 (0.22-0.99)	0.39	*	0.45 (0.21-0.97)	0.38	*
Received chemotherapy	0.59 (0.36-0.95)	0.25	*	0.59 (0.36-0.96)	0.24	*
Attentional control	1.01 (0.98-1.04)	0.02	NS	1.01 (0.98-1.04)	0.02	NS
Positive attentional bias	0.93 (0.86-1.02)	0.04	NS	0.93 (0.85-1.01)	0.04	NS
Negative attentional bias	1.02 (0.96-1.08)	0.03	NS	1.02 (0.96-1.08)	0.03	NS
Anxiety	1.06 (0.97-1.17)	0.05	NS	1.05 (0.95-1.16)	0.05	NS
Depression	1.13 (1.03-1.25)	0.05	*	1.14 (1.03-1.26)	0.05	*
Physical symptom distress	1.37 (0.83-2.24)	0.25	NS	1.19 (0.71-1.97)	0.26	NS
Avoidance	0.49 (0.26-0.90)	0.32	*	0.35 (0.18-0.67)	0.33	**
Intrusion	1.76 (1.06-2.92)	0.26	*	-		
Hyperarousal	-			3.37 (1.78-6.38)	0.33	**

*p<0.05; **p<0.01; NS= non-significant; OR, odds ratio; SE, standard error.

Health-related outcomes associated with persistent high sleep disturbance at two years post-treatment:
- Those reporting persistent high sleep disturbance were more likely to have greater **psychological distress**, reduced **physical** and **mental functioning** two years later.

Table 2. Binary logistic regression of health-related outcomes on sleep disturbance trajectories at two years post-treatment (stable good sleep group as referent)

	OR (95% CI)	SE	Sig.
Employment			
Full-time/part-time	0.48 (0.29-0.79)	0.25	*
Retired	0.77 (0.43-1.37)	0.30	NS
Housewife	0.42 (0.40-0.98)	0.37	*
Received chemotherapy	0.63 (.40-.98)	0.23	*
Psychological distress	1.09 (1.01-1.18)	0.04	*
Physical functioning	0.95 (0.93-0.99)	0.02	**
Mental functioning	0.97 (0.94-0.99)	0.02	*
Chronic Mental Fatigue	0.90 (0.75-1.09)	0.09	NS
Chronic Physical Fatigue	1.05 (0.98-1.13)	0.04	NS
Chronic Pain	0.85 (0.65-1.11)	0.14	NS

*p < .05; **p < .01; NS = nonsignificant; OR, odds ratio; SE, standard error.

Conclusion

- Precipitating factors, **including early cancer-related intrusive thoughts, hyperarousal, and depressive symptoms** predicts persistent high sleep disturbance, while **avoidance** predicted stable good sleep. These variables may reflect the Cognitive Attentional Syndrome (Wells et al., 1996); suggesting the presence of a maladaptive emotional response towards the cancer experience.
- Persistent high sleep disturbance may have **long-term effects** on **psychological and physical functioning** and **psychological distress** in cancer survivors.
- Poor sleepers were also more likely to be unemployed and may face irregular sleep-wake cycles due to lack of a daily routine.
- Unexpectedly, receiving chemotherapy predicted lower sleep disturbance. Early treatment effects such as fatigue may result in compensatory behaviors such as longer sleep time and bed rest (Savard et al., 2001). In return, continuity of such behaviours may perpetuate sleep disturbance and lead to impairment in functioning.
- Targeting early depressive symptoms, cancer-related intrusive thoughts and hyperarousal may be integral in preventing persistence of sleep disturbance and improving future quality of life in cancer survivors.

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